COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

AN INVESTIGATION INTO ALTERNATIVE LOAD FORECASTING METHODS AND PLANNING CONSIDERATIONS FOR THE EFFICIENT PROVISION OF ELECTRIC GENERATION AND TRANSMISSION FACILITIES	)	CASE NO. 8666

O R D E R

The Commission initiated this proceeding in its September 28, 1982, Order in this case. Attached to the Order as Appendix A was a proposed request for proposal. Parties to the proceeding were allowed to provide written comments concerning the request for proposal by November 19, 1982. A public hearing was held on November 29, 1982, to allow all parties to present their comments and allow the Commission to seek clarification of comments.

Comments were received from Louisville Gas and Electric Company ("LG&E"), Kentucky Utilities Company ("KU"), Big Rivers Electric Corporation, East Kentucky Power Cooperative, Inc. ("EKP"), Union Light, Heat and Power Company, Kentucky Power Company, and the Attorney General. A statement was received from the Kentucky Joint Committee on Electric Power Planning Coordination ("Committee"). The membership of the Committee consists of the senior officers of each of the six electric companies identified above.

OBJECTIVE OF THE STUDY

All of the comments received raised a serious concern about the Commission's intent to develop and implement the plan

for the most efficient provision of electric generation and transmission facilities. In hindsight, the Commission understands how the September 28, 1982, Order and Appendix A to that Order may have implied that this was the Commission's intent. However, this was never the intent, and the style of this case has been changed to reflect the objective which the Commission hopes to accomplish with this study.

The consultant's study is meant to be an investigation into alternative load forecasting methods and planning considerations. The Commission, through the testimony of utility personnel and intervenors in rate cases, through conversations with commissioners and utility executives in other jurisdictions, and through its reading of industry journals, has become aware of the need to consider alternatives. Many questions have been raised by this awareness. For instance, will the use of alternative load forecasting methodologies yield better forecasts, both in precision and quality, than the methods currently used? Can conservation and load management programs substitute or slow down the need to expand expensive generation facilities? Is the joint ownership of generation capacity an option for utilities in Kentucky? What is the potential to establish a power pooling arrangement?

The Commission knows these and other related questions are difficult questions to address. The Commission will not likely get definitive answers to all the questions raised for some time and then only after much study. But the time to begin addressing the questions is now. Ample stories of ratepayers

devastated by spiraling bills and utilities stretched to their financial limits have been proffered in the Commission's hearing room. The Commission's obligations to the ratepayers and the utilities demand that answers be sought. The search for these answers will undoubtedly provide guidance and direction on which the Commission can base future decisions.

SELECTION OF CONSULTANT

The proposed request for proposal was circulated and, as might be expected, resulted in numerous inquiries from consulting firms. An impressive list of consultants was developed. The problem was how to choose from such a list. It was decided to solicit the recommendations of other Commissions which had employed consulting services to perform similar work. Based on these recommendations, the Commission interviewed three consultants, each of whom submitted a proposal to the Commission. After careful review of the proposals, the Commission decided that the study proposed by Energy Systems Research Group, Inc., ("ESRG") of Boston was the most responsive to the Commission's needs. A list of the tasks to be performed by ESRG is attached to this Order (Appendix A). Although KU is specifically identified in the attached pages, the same tasks will be performed for LG&E. All tasks except 2(d) will be performed for EKP. Tasks 2(d) and 4 will not be performed for the remaining three utilities. Tasks 1(b), 2(e) and 3(c) are of particular interest to the Commission. Because of the scope and complexity of the study, it is crucial that the Commission, its staff and the

utility staff review the progress of the study and have an opportunity for input. These three tasks permit the review and input which are necessary for the successful completion of this task.

STUDIES IN CASE NOS. 8616, 8624 AND 8648

While in the process of choosing a consultant, rate cases were proceeding for LG&E (Case No. 8616), KU (Case No. 8624) and EKP (Case No. 8648). In all three cases there was considerable discussion of the quality of the load forecasts and system planning operations. These subjects are obviously related to this case. It was determined that there would be economies by using the same consultant to do additional analysis on the financial impacts of changes in construction schedules and implementation of conservation programs as an alternative to construction for these utilities. Therefore, the Commission will order that the studies mandated in the Orders in Case Nos. 8616, 8624 and 8648 be incorporated into the study in this case.

RECOVERY OF COST

The last page of the attachment provides a table of the breakdown of the costs of the study by utility. As previously stated in the Commission's Orders on Rehearing in Case Nos. 8616 and 8624, the costs of the study are to be recovered as proper expenses for rate-making purposes. Full recovery of all costs associated with the study will be considered in future rate proceedings. Recovery of these costs through rates is appropriate, since consumers will benefit to the extent any feasible alternatives are generated through the study.

The Commission will contract with ESRG to perform the tasks as proposed. The contract will specify that monthly invoices shall be sent to the Commission which will then review them and forward them to the six utilities for services rendered. Payment will be made within 10 days of receipt of the invoice. The total payment to ESRG by the utility shall not exceed the amount in the attached Appendix A. It is understood that agreement to participate in this arrangement does not necessarily imply endorsement of the study by the utility, nor does it constitute waiver by the utility of its right to question the results of the study.

CONFERENCE ON MAY 18

The Commission has previously scheduled a conference for May 18, 1983, at 10:00 a.m. with regard to this proceeding. The Commission will receive comments on the study at that time. A representative of ESRG will be available to answer any questions on the tasks to be performed.

SUMMARY

The Commission, having considered the comments of the parties, reviewed the proposals received and determined how best to accomplish its objective, is of the opinion and finds that:

1. The case style in this proceeding should be changed to better reflect what is to be accomplished by the study.

2. The studies ordered in Case Nos. 8616, 8624 and 8648 should be incorporated into the study in this proceeding.

3. The work proposed by ESRG should accomplish the study's objectives.

4. The cost of the study should be recovered as appropriate rate-making expense.

IT IS THEREFORE ORDERED that the case style for Case No. 8666 be and it hereby is changed to "An Investigation Into Alternative Load Forecasting Methods and Planning Considerations for the Efficient Provision of Electric Generation and Transmission Facilities."

IT IS FURTHER ORDERED that the studies previously ordered in Case Nos. 8616, 8624 and 8648 be and they hereby are incorporated into this case.

IT IS FURTHER ORDERED that ESRG shall be authorized to conduct the study in accordance with the proposals at a total cost not to exceed $173,400.

IT IS FURTHER ORDERED that the six utilities included in the study shall pay, within 10 days of receipt of a statement, the monthly charge as assessed by ESRG, but that the total payment to ESRG by the utility shall not exceed the amount in Appendix A of this Order.

IT IS FURTHER ORDERED that the recovery of the cost of the study shall be allowed for rate-making purposes.

IT IS FURTHER ORDERED that the recovery of any additional costs associated with performance of this study will be considered in future rate proceedings.

IT IS FURTHER ORDERED that the six utilities included in this study shall make available to ESRG all records and information reasonably needed by ESRG in the conduct of this study.

Done at Frankfort, Kentucky, this 1st day of May, 1983.

PUBLIC SERVICE COMMISSION

Chairman

Vice Chairman

Commissioner

ATTEST:

Secretary

II. TASKS TO BE PERFORMED

In this section, Energy Systems Research Group sets forth the method by which it will complete each of the five tasks contained in the Commission's draft RFP. For certain of the tasks we have indicated subdivisions that appear appropriate to us.

We propose to fully complete all five tasks, with one exception: task four, a "detailed conservation program for Kentucky," would ideally involve six utility program designs at a high level of specificity. In order to keep the total study at a modest level, we have approached task four on a selective basis. For Kentucky Utilities Co. we will create such a program design.

In summary form, the tasks as subdivided and described herein are:

Task	Subject
1	Load Forecasting
1(a)	Basic Forecasting Analysis
1(b)	Forecast Review and Revisions
2	Supply Analysis
2(a)	Transmission System Analysis
2(b)	Power Plant Modelling
2(c)	Power Plant Modelling Under Transmission Constraint and Power Pooling Scenarios
2(d)	Financial Analysis of Utility Construction Programs
2(e)	Supply Analysis Review and Revisions
3	The Potential for Conservation
3(a)	Conservation Scenario Load Forecasts
3(b)	Conservation Cost Analysis
3(c)	Conservation Review and Revisions
4	Conservation Program Design
5	Additional Recommendations

The results of these tasks and subtasks will be presented, with full explication and documentation, in a set of four reports. These are:

Report I: Executive Summary and Overview
Report II: Load Forecasts for Kentucky Utilities
Report III: Conservation Potential and Program Priorities
Report IV: Integrated Supply Plan for Kentucky Utilities.

Task 1, Load Forecasting

ESRG will perform long-range forecasts of energy and demand for Kentucky Utilities Co. A statewide summary forecast will also be provided. We have broken this task into two parts -- our initial analysis, and a finalized analysis based on consultations with the Commission and the respective utilities.

Task 1(a), basic analysis. ESRG will use its state-of-the-art load forecasting model, described in the previous section of this proposal, to carry out the forecast for Kentucky Utilities Co. of energy consumption and winter and summer peak demand over a planning horizon extending into the next century. These "Base Case" forecasts will be designed to reflect "business-as-usual" conditions, using the various economic and demographic projections developed by agencies of the State of Kentucky, the U.S. Department of Commerce, etc.

The Base Case forecasts will include specific assumptions concerning a range of conservation levels that will occur under existing market trends and public policies. The ESRG demand forecasting model allows for a wide range of sensitivity or alternative scenarios to be run, depending on the requests of the Commission or its staff. Economic, demographic, technical, price, and policy variables can be easily varied. Task 1(a) will terminate with production of draft reports on the Base Case demand forecasts.

Task 1(b), forecast review. ESRG will then review the Task 1(a) draft reports with PSC and utility staff and prepare final computer runs and reports. This task involves the critical process of review, discussion, and revision of the ESRG methodologies and assumptions used in carrying out the initial forecasts. We propose a series of meetings in Kentucky with the PSC staff, and the technical staff of Kentucky Utilities Co. Following this review process, ESRG will revise its draft report from Task 1(a), and submit to the Commission its draft Final Report. The Commission's response to this draft will then be incorporated into the Final Report as appropriate. The demand tasks will require finalization well before the power supply and financial tasks can be finalized, and this necessity will be reflected in the proposed project schedule below.

Task 2, Supply Planning

ESRG will provide an integrated review of all new generation and transmission facilities proposed by regulated Kentucky utilities, employing an independent analysis based on the SYSGEN

production costing model and, in selected instances, the ELFIN utility financial model, to inform its review. We have broken this major task into the five following subtasks. This analysis will be prepared in an integrated fashion for all relevant electric utilities in Kentucky.

Task 2(a), transmission system analysis. This task will include an analysis of the existing transmission system and planned transmission facilities for the six major Kentucky utilities. In conjunction with the power supply analysis of Tasks 2(b) and 2(c), any near term and long term constraints posed by the Kentucky transmission system on the possible benefits that could be gained from increased power pooling among these utilities will be identified. (The desirable level of power pooling itself will be specified as a result of the dispatch analysis in Tasks 2(b) and 2(c).)

If constraints are identified, measures will be suggested to remove these constraints, and initial cost/benefit analysis of alternatives will be presented. ESRG will subcontract portions of this subtask to the firm of Alexander Kusko, Inc., consulting engineers, with whom ESRG has previously worked. ESRG and Kusko staff will consult actively with engineers of the electrical utilities in Kentucky during the course of the analysis, and thus utility review will be ongoing in this task. Again, a draft Final Report on the task will be presented to the Commission for comments.

Task 2(b), engineering and economic modelling of new power plants under construction and proposed. ESRG will review and assess the projected cost and technical characteristics of all power plants under construction or proposed by utilities within Kentucky. The economic cost/benefit of these plants will then be reviewed at two levels; the individual utility level and the statewide level. This will be accomplished by setting up power plant data files for each of the major electric generating utilities in Kentucky for use in ESRG's power plant dispatch model SYSGEN. This model was developed at the MIT Energy Laboratory for U.S. DOE, and has been up-graded by ESRG. These individual utility power plant data files will also be aggregated for the entire state. In this manner, the cost effectiveness over the planning period 1982-2000 of each power plant can be assessed separately for the constructing utility and the state as a whole by dispatching SYSGEN each of these two ways.

Previous ESRG supply analyses referenced above in this proposal illustrate the importance of such an approach. For example, the Southern Co. as a whole was a power pool, and the particular construction program that ESRG reviewed was that for the Alabama Power Co. For this task in this study utility company assumptions will be used whenever possible, and both the ESRG and the Company demand forecasts will be input to produce a wide range of reasonable demand/supply scenarios. Note that the specific

construction programs of the utilities within Kentucky need to be addressed separately as well as jointly, especially regarding plants already under construction.

Task 2(c), dispatch assessment of possible power pooling enhancement. For this subtask, runs of the SYSGEN model at a statewide level will be compared with and without the presence of any transmission constraints discovered in Task 2(a). This will allow the increase in the cost of power to ratepayers to be measured against the cost of upgrading the transmission system, if necessary. In addition, the cost of power to ratepayers of each major generating utility will be computed under a scenario that includes power pooling to the extent presently practiced within Kentucky, as compared to these costs under a scenario which allows for the maximum degree of power pooling possible. The results of this analysis will be reviewed in light of possible institutional constraints and presented as the basis for ESRG's Draft Report to the Commission in this area.

Task 2(d), financial analysis of construction programs. ESRG proposes here to perform a financial analysis of the construction program of Kentucky Utilities Co. This analysis will be performed with ESRG's comprehensive ELFIN corporate financial simulation model. This model produces the full range of corporate balance sheets, income statements, sources and uses of funds statements, and calculates key financial indictators such as coverage ratios. Again, this model was used in both the Alabama Power Co. and Consolidated Edison studies previously sent. As in Tasks 2(b) and 2(c), most of the data for this analysis would be taken directly from the utilities themselves. One key "bottom-line" produced by ELFIN is the annual cost of electricity per kilowatt-hour for the system modelled for the planning period 1982-2000. This model can be run for a wide range of construction programs and demand/supply scenarios consisting of those analyzed in Tasks 2(b) and 2(c) above.

Task 2(e), review of Tasks 2(a), 2(b), and 2(c) with PSC and utility staffs: preparation of final computer runs and reports. For this task, the same set of procedures will be followed as for Task 1(b) above.

Task 3, The Potential for Conservation

ESRG will analyze levels of additional conservation that are cost-effective compared to the cost of increasing the supply of electricity in Kentucky. We have broken this task into two subtasks -- the end-use analysis of conservation potential, and the cost-benefit analysis of conservation levels.

Task 3(a), conservation case forecast. ESRG will develop a scenario embodying a cost-effective level of additional conservation. That is, conservation beyond the levels incorporated in the "Base Case" load forecasts. The details of the scenario will be varied to take into account utility-specific constraints as appropriate. Following an initial screening analysis of conservation measures and levels, ESRG's end-use forecasting model will be used to project the impact of the conservation scenario on the energy consumption of each utility (by major customer sector), as well as the reductions in summer and winter peak that would ensue from successful implementation of the conservation scenario. The ESRG demand forecasting model allows for a wide range of sensitivity of alternative scenarios to be run for either the Conservation Case forecasts, depending on the requests of the Commission or its staff. Economic, demographic, technical, price, and policy variables can be readily altered. The results of Task 3(a) will be described in a draft report.

Task 3(b), conservation cost analysis. ESRG's CONCOST and HOMES models, described in Section 1 above, will be employed to compute the principle costs and benefits of implementation of the conservation scenarios employed in Task 3(a). These results will be computed to the year 2000. Along with the results from Task 4, they will be incorporated in the Task 3(a) report.

Task 3(c), consultative review. This task will parallel, and be performed in conjunction with, Task 1(b).

Task 4, Conservation Program Design

Based on the analysis in Task 3, including a review of ongoing utility conservation efforts in Kentucky, it will be possible to identify the main outlines of utility and consumer conservation investment programs appropriate for Kentucky. In addition, ESRG will work with the Commission Staff to develop a timetable for actions the utilities, consumers, legislature, and the Commission can take to begin to implement this program, in the light of our current knowledge concerning workable educational, incentive, and financing techniques for overcoming institutional barriers to customer investment in cost-beneficial conservation measures.

Utilizing ESRG's extensive conservation program development experience throughout the U.S., a detailed pilot investment program will be designed for Kentucky Utilities Co. Mechanisms for program implementation will be addressed. A draft final Report on Task 4 would be prepared for Commission review, leading directly to the Final Report.

Task 5, Additional Recommendations

ESRG intends to incorporate any appropriate recommendations for a "least-cost" energy strategy into the comprehensive review of load forecasting, conservation scenario development, supply planning, and conservation program development that is described by Tasks 1-4.

All findings and recommendations will be gathered together in an Executive Summary report to the Commission.

III. BUDGET OUTLINE BY TASK

A. The following table lists the proposed task costs for the entire set of four proposals comprising the complete analysis for all six major Kentucky electric utilities:

Task #	Description	Proposed Cost
1(a)	Base Case Forecasts including statewide forecast	$ 31,150
1(b)	Forecast Report Review and Revisions	9,000*
2(a)	Transmission System Analysis	12,000
2(b)	Economic/Engineering Analysis of Construction Programs (statewide and utility specific)	37,000
2(c)	Power Pooling Dispatch Analysis (with and without transmission constraints)	15,000
2(d)	Construction Program Financial Analysis (with modelling for two utilities)	20,000
2(e)	Supply and Financial Report Review and Revision	15,000*
3(a)	Conservation Case Forecasts	5,000
3(b)	Conservation Cost Analysis	7,500
3(c)	Conservation Analysis Review	3,000*
4	Conservation Program Development (for three utilities)	18,750
Total Project		$173,400

Thus generic tasks 1, 2a, 2b, 2c, 2e, and 3 are proposed at $134,650.

* These costs are maximum estimates. If less revision is required only the lower actual amounts expended will be charged.

+ This cost includes all labor charges and expenses. A breakdown of this total can be found on page 23.

B. The following table lists the proposed project cost breakdown for each of the four proposals: the principle utilized is that each Company or set of Companies should pay for the study applicable to them in proportion to their 1981 sales figures, on the basis of equity.

Utilities	1981 Sales (GWH)	Tasks 1,2a,2b, 2c,2e,3 Cost Allocation Factor	Cost	Task 2d Cost	Task 4 Cost	Total Cost
Kentucky Utilities Co.	10,653	.266	$ 35,817	$10,000	$ 6,250	$ 52,067
Louisville Gas & Electric Co.	7,660	.192	25,853	10,000	6,250	42,103
East Kentucky Power Cooperative Inc.	4,422	.111	14,946	0	6,250	21,196
Kentucky Power Co.	6,482	.162	21,813	0	0	21,813
Big Rivers Electric Corp.	8,938	.224	30,162	0	0	30,162
Union Light, Heat and Power Co.	1,802	.045	6,059	0	0	6,059
Total	39,957	1.000	$134,650	$20,000	$18,750	$173,400